12. ADDITIONAL COMPONENTS OF THE SELECTED REMEDY FOR WASTE AREA GROUP 5

In addition to the remediation that will be applied to specific sites, several activities will be implemented at WAG 5 to complete the selected remedy. These activities, including disposition of stored and investigation-derived waste and groundwater monitoring, are discussed below.

12.1 Disposition of Stored Waste and Investigation-Derived Waste

In 1996, the contents of the three ARA-02 septic tanks, a total of approximately 5,678 L (1,500 gal), were removed and placed in thirty-one 208-L (55-gal) drums. The decontamination waste (diesel) from the removal action, and investigation-derived waste from the ARA-16 sampling filled an additional 24 drums. The 55 drums were placed in compliant storage at ARA-II near the septic system. The 55 waste drums will be addressed during the comprehensive RD/RA for WAG 5.

All but eight of the 55 drums contain waste that can be accepted by WERF and will be sent to that facility for incineration. The eight remaining drums contain PCB concentrations at levels regulated by TSCA (40 CFR 761) and cannot be accepted by WERF. The eight drums of PCB-contaminated waste will remain in storage at ARA-II until they can be sent to the AMWTF or another compliant facility for treatment. If the waste cannot be sent to a treatment facility within 2 years of the issuance of this ROD, the waste will be relocated to the Mixed Waste Storage Facility or another compliant centralized INEEL location for continued storage until a treatment facility is available.

The WAG 5 Proposed Plan (DOE-ID 1999b) indicated that the 47 drums would be processed at WERF and the remaining eight drums would be sent to approved facilities for treatment and disposal, but the costs associated with the disposition of the waste were not presented. The estimated costs for disposing of the stored waste are given in Table 35.

Contaminated media such as soil, debris, liquids, sample residue, sampling equipment, and personal protective equipment, not identified by the INEEL FFA/CO or in this comprehensive investigation, may be generated as a result of RD/RA activities at WAG 5. Procedures to address the investigation-derived waste will be documented in the remedial action work plan. In addition, legacy waste that has been generated as a result of previous sampling activities at WAG 5 will be appropriately characterized, assessed, and dispositioned in accordance with regulatory requirements to achieve remediation goals consistent with remedies selected for the sites in this ROD.

12.2 Groundwater Monitoring

Groundwater monitoring will be conducted annually at WAG 5 at least until the first 5-year review. The risk estimates in the WAG 5 RI/FS for groundwater use did not exceed 1E-04 and the hazard indices were less than or equal to 0.5 (Holdren et al. 1999). Based on the analysis of the nature and extent of contamination and risk estimates, alternatives to address groundwater pathway risks were not analyzed. However, risk estimates, a risk-based concentration, and a maximum contaminant limit for lead in groundwater were not developed because toxicity data are not available. Lead concentrations attributable to INEEL operations may be occurring in groundwater at WAG 5 that exceed the EPA action level and Idaho groundwater quality standard for lead of 15 μg/L (EPA 1996 and IDAPA 16.01.11.200). Groundwater monitoring will be conducted to reduce the uncertainties associated with the previous sampling and to provide trend data to assess the possibility that an unidentified source of lead contamination is affecting the aquifer.

Table 35. Cost estimate summary for final disposal of the CERCLA waste currently in compliant storage at ARA-II.

Planned Activity		Cost (Fiscal Year 1999 dollars)
FFA/CO management and oversight		
	WAG 5 management	250,000
Remedial design		
	Remedial design/remedial action scope of work	NA
	Remedial action work plan	NA
	Packaging, shipping, transportation documentation	48,000
	Remedial action report	NA
	Data collection and management for first 5-year review	NA
	Safety analysis documentation	NA
	Sampling and analysis plan	NA
	Pre-final inspection report	NA
	Legal review	NA
	Total title design package	NA
	Site characterization	NA
Remedial action—construction subcontract		
	Treatment subcontract	86,000
Management and operations contractor support for the disposal contract		25,000
CAPITAL COST SUBTOTAL		409,000
	Contingency @ 30%	123,000
TOTAL CAPITAL COST IN FY-99 DOLLARS		532,000
TOTAL CAPITAL COST IN NET PRESENT VALUE		532,000
Operations		
	Program management	NA
	Data collection and management for 5-year reviews	NA
	Maintenance	NA
	Decontamination and dismantlement	NA
	Surveillance	NA
OPERATIONS AND MAINTENANCE COST SUBTOTAL		NA
	Contingency @ 30%	NA
TOTAL OPERATIONS AND MAINTENANCE COST IN FISCAL YEAR 1998 DOLLARS		NA
TOTAL OPERATIONS AND MAINTENANCE COST IN NET PRESENT VALUE		NA
TOTAL PROJECT COST IN NET PRESENT VALUE		532,000

The results from three WAG 5 groundwater sampling campaigns (i.e., April and July 1995 and August 1997) and output from GWSCREEN fate and transport modeling were interpreted in the WAG 5 Comprehensive RI/FS (Holdren et al. 1999). The detected and modeled concentrations of lead were compared to the 15-μg/L standard. Five wells in WAG 5 had at least one groundwater sample with detected lead concentrations exceeding 15 μg/L. The results of the GWSCREEN modeling indicate that the known concentrations of lead in WAG 5 soil are not causing elevated lead concentrations in groundwater.

The most likely cause of the apparently elevated lead concentrations is related to sampling and analysis. Naturally occurring lead and well construction materials are probably not sources of lead in the aquifer. Evidence of possible sampling error was observed in the April 1995 samples from Well ARA-001, for which duplicate sample values were 8.2 μg/L and 75.7 μg/L.

Sample preparation, such as filtering and sample digestion, also can influence analytical results. The potential exists for particulate matter from the well to be included in the water sample. The occasional incorporation of particles into the groundwater samples may generate the few relatively high lead results that occur amid a larger number of typically lower values. With a larger data set, the apparent outlier values could be discriminated from the bulk of the data. Furthermore, samples for lead analyses are digested, meaning the water sample is treated with a strong acid before analysis to ensure that all of the particulate matter is broken down. Sample digestion may be the cause of the occasional spikes of high lead concentrations in WAG 5 and INEEL data sets because particulates (either soil particles or flakes of well material) may occasionally be collected into the sample bottles. For that reason, future samples for lead analysis should be filtered.

Samples will be collected within a year of the date of the signing of this ROD and annually thereafter at least until the first 5-year review for this ROD, when the need for continued groundwater monitoring will be assessed. The analytes will be determined during the development of the groundwater sampling and analysis plan. Costs for monitoring the full suite of groundwater analytes are included in the estimate for 5 years of groundwater monitoring provided in Table 36.

Table 36. Estimated costs for groundwater monitoring at Waste Area Group 5.

	Planned Activity	Cost (Fiscal Year 1999 dollars)
Operations	Field sampling plan	44,000
	Health and safety plan	29,000
	Annual sample collection for 5 years	47,000
	Annual sample analysis for 5 years	30,000
	Sample management for 5 years	33,000
OPERATIONS AND MAINTENANCE COST SUBTOTAL		182,000
	Contingency @ 30%	55,000
TOTAL OPERATIONS AND MAINTENANCE COST IN FISCAL YEAR 1999 DOLLARS		238,000
TOTAL OPERATIONS AND MAINTENANCE COST IN NET PRESENT VALUE		212,000
TOTAL PROJECT COST IN NET PRESENT VALUE		212,000

13. DOCUMENTATION OF SIGNIFICANT CHANGES

Several issues relative to the components of the selected remedy for WAG 5 were either not presented in the WAG 5 Proposed Plan (DOE-ID 1999b) or were modified after the Proposed Plan was published. These differences from the Proposed Plan are discussed below.

13.1 Modification to the Preferred Alternative for Contaminated Soil Sites

Alternative 4, removal and disposal, and Alternative 5, removal, ex situ sorting, and disposal, for the contaminated soil sites were developed separately but combined for presentation in the Proposed Plan (DOE-ID 1999b). The preferred alternative for the contaminated soil sites presented in the Proposed Plan was labeled Alternative 5a and described as excavation, ex situ sorting, and disposal at the INEEL. Alternative 4a was identified as a subset of Alternative 5a. However, subsequent to finalization of the Proposed Plan, a treatability study was performed using the segmented gate system (see Section 8.10.5) to determine whether ex situ sorting of the contaminated soil at WAG 5 would achieve a substantial reduction in the volume of soil requiring disposal.

The results of the treatability study indicate that the soil at WAG 5 cannot be successfully sorted to satisfy the 23-pCi/g final remediation goal for Cs-137 (see Table 16) with any volume reduction. Therefore, the analysis of alternatives in this ROD for the contaminated soil sites reflects a return to the presentation of alternatives developed in the RI/FS. The selected alternative in this ROD is Alternative 4a. As summarized in Section 8 and documented in the WAG 5 Comprehensive RI/FS report (Holdren et al. 1999), Alternative 4a consists of excavation and disposal without sorting at the ICDF or another facility on the INEEL.

13.2 Operable Unit 5-05, ARA-06 Stationary Low Power Reactor No. 1 Burial Ground

Operable Unit 5-05 comprises the SL-1 Burial Ground, Site ARA-06, and the surrounding area. An RI/FS (Holdren, Filemyr, and Vetter 1995) was conducted for this operable unit. In accordance with the OU 5-05 ROD (DOE-ID 1996b), an engineered barrier was placed over the landfill. Two elements relative to the OU 5-05 ROD have been modified. First, contaminated soil detected during the GPRS survey of the windblown contamination area around ARA-I and ARA-II will be remediated in conjunction with the cleanup of Site ARA-23. Some of this soil is within the area once defined as OU 5-05. Second, post-remedial requirements for OU 5-05 will be consolidated with the post-remedial requirements for OU 5-12.

13.2.1 Surface Soil Contamination in Operable Unit 5-05

The original boundary for OU 5-05, Site ARA-06, was defined as the fence surrounding the SL-1 Burial Ground. However, the OU 5-05 ROD redefined the operable unit boundary to include the northeast 40% of the windblown contamination area around ARA-I and ARA-II. Dose equivalent rate measurements outside the burial ground fence indicated radiological field levels at or below the average INEEL level of 20 μrem/hour (Jorgensen 1995). Therefore, no unacceptable external exposure risks were identified for this area, and DOE-ID, EPA, and IDHW reached consensus that no further action would be required for the surface soil outside the burial ground fence. However, this area was surveyed during the 1997 GPRS survey of ARA-I and ARA-II, and Cs-137 was detected at concentrations in excess of the preliminary remediation goal of 23 pCi/g identified for WAG 5 (Holdren et al. 1999). Therefore, the surface soil in OU 5-05 exceeding the Cs-137 remediation goal of 23 pCi/g will be remediated as part of

Site ARA-23 during the comprehensive RD/RA. In addition, the original definition of the boundary for OU 5-05, the fence surrounding the SL-1 Burial Ground, was reestablished to simplify the implementation and management of long-term institutional controls for ARA-23 (the windblown contamination area) and ARA-06 (the SL-1 Burial Ground).

13.2.2 Post-Remedial Requirements

Based on the results of the OU 5-05 baseline risk assessment, human health risk will diminish to less than 1E-04 in approximately 400 years (Holdren, Filemyr, and Vetter 1995). Therefore, institutional controls must be maintained at OU 5-05 for that time period. During this period, 5-year reviews and site maintenance (e.g., fences, signs, vegetation, and subsidence) must be conducted to ensure the continued protectiveness of the remedy implemented at SL-1. These activities will be consolidated with the post-remedial activities for OU 5-12 at the earliest opportunity. The first 5-year review will be implemented for OU 5-05 in 2001, and the next review is scheduled for 2006. However, consolidation of the OU 5-05 review with the OU 5-12 review is anticipated before 2005. Therefore, the OU 5-05 review may be conducted before the second 5 years have passed.

13.3 Arsenic in the ARA-01 Chemical Evaporation Pond

Arsenic was detected at ARA-01 in concentrations above the INEEL background value, and risk was evaluated for human health. However, the maximum detected arsenic concentration at ARA-01, 25.8 mg/kg (Holdren et al. 1999), is within the range of WAG 5 background values of nondetection to 38.6 mg/kg (Martin et al. 1990; Stanisich et al. 1992). Therefore, arsenic was not identified as a human health COC. In the process of developing remediation goals for ARA-01, WAG 5 background values were closely examined. Though the PBF background concentrations for arsenic are high in comparison to INEEL background values, ARA background concentrations are comparable to the INEEL value of 5.8 mg/kg (Rood, Harris, and White 1996). Therefore, arsenic is now identified as a human health COC for ARA-01. The site will be remediated to address human health risks from arsenic in addition to remediation to address ecological risks from thallium and selenium. Because ARA-01 was already identified for remediation, adding arsenic to the COC list does not affect the validity of the analysis of alternatives or the selected remedy for ARA-01. The remedial action objectives for the contaminated soil sites (see Section 8.2) do not require revision because dermal absorption, the exposure pathway of concern for arsenic at ARA-01, is addressed. A remediation goal for arsenic at ARA-01 has been established, as presented in Table 16.

13.4 Lead in ARA-25 Contaminated Soil and the ARA-02 Sanitary Waste System Seepage Pit

Lead was identified in the WAG 5 RI/FS risk assessment as a contaminant of potential concern for the contaminated soil at ARA-25 and the ARA-02 Sanitary Waste System seepage pit and (Holdren et al. 1999). The human health risk associated with lead could not be quantified because reference doses for lead have not been developed. As a result, lead was not presented as a contaminant of potential concern in the risk summary in the RI/FS (Holdren et al. 1999, Section 8) or in the WAG 5 Proposed Plan (DOE-ID 1999b), and a preliminary remediation goal was not developed. However, because the maximum detected lead concentrations of 1,430 mg/kg in ARA-25 soil and 1,290 mg/kg in the ARA-02 seepage pit sludge exceed the EPA lead screening level of 400 mg/kg (EPA 1994b), a lead remediation goal has been identified for both sites in this ROD (see Tables 16 and 22). The lead will be mitigated by implementation of the selected remedies for ARA-25 and ARA-02.

13.5 Risks from Ag-108m and Cs-137 at ARA-12

The risk estimates in the WAG 5 RI/FS for Site ARA-12, the Radioactive Waste Leach Pond at ARA-III, were developed based on limited analytical data and information from the 1997 GPRS survey of the ARA-III facility (see Section 8.2). Unacceptable risks from external exposure to Ag-108m and Cs-137 were identified (Holdren et al. 1999).

To estimate risk, the GPRS data were interpreted using the assumption that the elevated gamma readings were generated by Cs-137 contamination in the soil. Though soil samples were collected to verify the GPRS readings, the analytical results (Giles 1999b) were not available until after publication of the WAG 5 Proposed Plan (DOE-ID 1999b). The analytical results show that most of the gamma radiation detected at ARA-12 is attributable to Ag-108m and that Cs-137 concentrations are much lower than anticipated. The risk estimates for Cs-137 are, therefore, overestimated because the GPRS data converted to Cs-137 concentrations were used to evaluate external exposure to Cs-137. The maximum detected Cs-137 concentration is only 4.42 pCi/g, significantly less than the 23 pCi/g risk-based remediation goal. Therefore, Cs-137 is eliminated as a COC for ARA-12.

The risk estimates in the RI/FS for Ag-108m were based on the analysis of soil samples collected in 1993 (Pickett et al. 1994). Because the concentrations of Ag-108m detected in 1993 are higher than those detected in 1999, the risk estimates developed with the 1993 data are upper-bound estimates.

The risk estimate for Ag-108m also was based on a half-life of 130 years. Recently, the half-life for this isotope was revised to 418 years (Firestone and Shirley 1999). Because the longer half-life would increase the risk estimate and the site has already been identified for remediation, the risk estimate for ARA-12 was not revised. However, the remediation goal was revised as appropriate (see Table 16).

The impact of this information on the analysis and selection of a remedy for ARA-12 is negligible. The Proposed Plan identified Ag-108m as a contaminant of concern at this site and a preliminary remediation goal was presented. The remediation goal is a risk-based soil concentration and is not dependent on the detected concentrations at the site. Therefore, revised risk estimates were not developed. Though the risk estimates for ARA-12 reported in the Proposed Plan were not revised, the conclusions based on the estimates (i.e., the decision to remediate and remedy selection) are protective of human health and the environment.

13.6 Institutional Control Sites

As discussed in Section 11.1 and reflected in Tables 32 and 33, 15 sites in WAG 5 have been identified in this ROD for institutional controls. In the WAG 5 Proposed Plan (DOE-ID 1999b, Tables 16 and 17), 29 sites were identified for institutional controls and 19 sites were identified as not requiring institutional controls. Subsequent review of WAG 5 sites using the recently released EPA Region 10 policy for institutional controls (EPA 1999b) resulted in several modifications to the lists in the Proposed Plan. Most of the changes involved sites with structures (e.g., septic tanks and seepage pits). In the Proposed Plan, the sites with remaining structures were identified for institutional controls. However, such sites were not identified in this ROD for institutional controls unless residual contamination precludes unlimited exposure (see Section 12). Those sites that were changed from one classification to the other are indicated in Table 32.